BEE

Midsem Saviour

Norton gaadi veera electric gaadha

Electric current

Rate of flow of charge

$I = \frac{Q}{t}$

Unit → Ampere

Electric power

Rate of change of electric energy per time

$P = VI$

Unit → watts

Resistance

Ability of material to oppose current

Unit → Ohm Ω

Ohm's law:-

Voltage across a conductor is directly proportional to the current flowing via it

$V = IR$

Inductance

Property of an element by which it opposes change in current

Unit → Henry

aunty (Inductance) doesnt want her current bill to change a lot every month

Capacitance (C)

Property of an element by which it opposes change in voltage

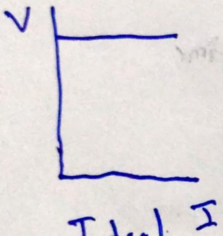
Unit → farads (F)

Mnemonic: neighbour (capacitance) wont let voltage build in me because ill cook him like potlakay

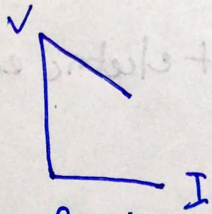
Voltage (V):-

Ideal voltage source → voltage constant irrespective of current

Practical voltage source → As I decreases, V slowly decreases



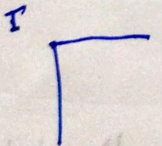
Ideal



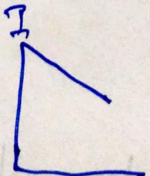
Practical

Ideal current source → I is constant irrespective of voltage

Practical current source → As V decreases, I decreases



Ideal



Practical

Resistance

$R = \rho \frac{l}{a}$

Limitations of ohm's law:-

1) applicable only for metallic devices
2) not applicable for semiconductors
3) not applicable for thyrite resistors → thyroid unna vallaki ohm ana radu

Nodes:-

Point where 2 or more elements are connected to it

(Basically open marriage)

Junction:-

Point where 2 elements are connected

(Hammaya, normal marriage)

Branch:-

Part of network which lies between 2 nodes

(Divorce lawyer trying to connect 2 couples)

loop:-

Closed path in circuit

Mesh:-

Mesh is a closed path that doesnt contain other closed paths

(ontari jeevitham papam)

KCL:-

Sum of currents entering junction is equal to current leaving the junction

(what goes in ~~what~~ must come out)

KVL:-

Voltage around a loop is sum of voltage drop across loop is zero

(Le me after using my full potential to study bee)

Voltage in series → more voltage

(The voltage in Series! Arey naak ekkuva aindi ra)

voltage in parallel → Same voltage but more current

Resistance in series (roomai abbai)

$R_{eq} = R_1 + R_2 \ldots$

(Arey naak kuda ekkuva aithundi ra)

Resistance in parallel (theda)

$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2}$$

(mama enti ra em chesina naa voltage perigatle endhi ra)

Conductance

ability or measure of which electric current flows via materials

~~$G_T = \frac{1}{G_1} + \frac{1}{G_2}$~~

$G_{eq} = G_1 + G_2$

Voltage division rule (rule for normal abbais

$$V_I = V \frac{R_2}{R_1 + R_2}$$

(voltage gadiri irragodtha)

Applicable for normal abbais (series) only

~~Vot~~

Current division rule (theda gallaki theda rules)

$$I_I = I \frac{R}{R + R_1}$$

Mesh Analysis (bajrang dal attack on couples)

KVL vaada ra papam mesh gadu okkade unnadu

Step 1:- Identify loops & loop current

Inga kaniyandi ra loop gallani valla porilu (loop current) thoti thiruguthuru, payyi identify chuyyandi

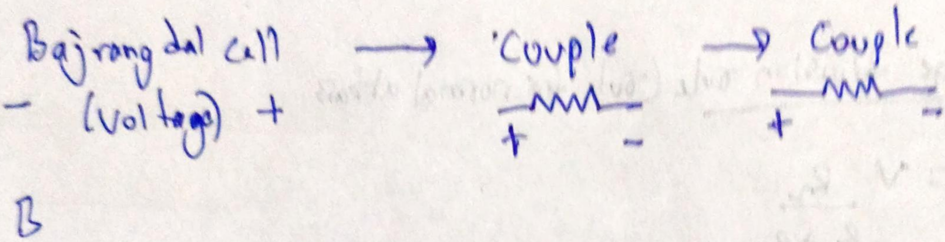
Step 2:- Express all branches in terms of loop currents

Bajrang dal has successfully sent its branches to find loop currents (lovers) in the park

Step 3:- Assign polarities for all $\mathcal{V}$ & V_0

couples ni line lo, order lo ninchopettandi

format:-



Step 4:- form loop equations

Find how much you can loot from each couple

Step 5:- Solve loop equations

Settlement time

Nodal Analysis:- (open marriage mela)

KCL vadu bro, assal ke open marriage vallu (nodes)

Step 1:- Identify nodes & take 1 node as reference node

open marriage vallani identify chesi andhulo oka empty couple

ne reference ga thisko

step 2:- Express all branch current in terms of nodal voltages

Marriage counsellor visits each branch of couple and checks their potential

step 3:- Assign polarities

Malli couples ni arrange cheyyali mana counsellor garu, Bajrang dal method ae iga

step 4:- KCL vadu bro

step 5:- Settlement by finding equations for couples and arranging them
(super position meme ra)

super position theorem:- (

Statement:- current which flows at any point in the network is the algebraic sum of all the currents which would flow at point in the network if each source were considered separately

my statement:- Current gadu ekkada kani pinchina ~~current~~. Prathi source lo unna current gallani theskocchi add chestha, idhi naa super position meeda ottu

step 1: Replace second source by internal resistance

Papam source gadu, lopala unna resistance vadini mingesindi

Step 2: Kadha maruthundi, network motham maru thundi, last ki first source gadi lopala unna resistance vadini mingesindi

Step 3: inga em undi, unna vaalu add cheskondi, leda Subtract cheskondi, vaadi direction batti

Thevenins office
Thevenin's theorem: (Resistance lo normal abbaiaki (series))

Simplified statement/story:- Oka office lo thevenin ane vaadu unde vadu. Vaadi office lo unna voltage gallani current gallani, resistance gallani thesesi oka single voltage gadi thoti normal abbai laga (series) with resistance thoti recruit chesthadu

Ee kotha voltage gaadu chala open ga untadu

Kani resistance gadi lo vadi total resistance matram lopala unna resistance thoti replace ai pothundi

Step 1: Redraw network by removing R_L

Oka resistance gadini peekesindu Thevinin

Step 2: Calculate open circuit V_{th}

Poyyi aa voltage gadu baaga open ga untundu ga openness measure cheyi →

$$I = \frac{E}{r + R_1 + R_2}$$

$$V_{th} = I \cdot R_2 =$$

Step 3:- Calculate R_{th}

ippudu thevenin gaadi resistance try cheddam

$$R_{oc} = R_2 \parallel (R_1 + r)$$

Step 4:- Replace entire network with thevenin equivalent network by connecting R_L

Resistance occhindi kani thevenin's agents ac office lo migilaru

$$I_L = \frac{V_{th}}{R_{th} + R_L}$$

Norton's theorem:- Norton's divorce

Simple statement:-

His multiple wives (energy sources) & children (resistances) got replaced by another family with a theda (parallel) wife and kid (resistance)

His current source would flow through swargam (short circuit)

Step 1) Remove resistor & replace it with short circuit

Send resistor (kid) to swargam as well

2) calculate I_{SC} using a suitable theorem here superposition

Send superposition gang after the kid to swargam

3) calculate R_{nor} or R_{th}

4) Redraw the circuit by removing voltage source

last ki norton gadi divorce lawyer (voltage) kuda pothadu

5) Find I_L

last ki norton gadu divorce theskoni, inkoka I_L ni vethukuthadu